Ocean Spray Cranberries, Inc.

OVERALL TREATMENT PROCESS

GENERAL

The overall facility was designed to accomplish six major wastewater treatment objectives:

- Course screening using the static screen.
- Flow equalization.
- Neutralization to a pH range between 6.0 and 9.0 by the addition of magnesium hydroxide as required.
- Nutrient addition
- Suspended solid and BOD removal to a concentration of 50 mg/L or less by secondary biological treatment.
- Thickening, digestion, and dewatering of waste biological solids.

OVERVIEW

RAW WASTE PUMPING

Raw process wastewater is collected from the manufacturing plant and transferred, via a 10-inch PVC gravity sewer, to the raw waste lift station. Sanitary waste from the manufacturing plant is collected separately and discharged directly to the POTW collection system.

The raw waste lift station includes a wet well, two self-priming centrifugal pumps, pump controls, and auxiliary piping and valves. These pumps deliver the wastewater, via a 6- inch PVC force main, to the IPS. The pumps are operated in an on-off cycling mode based on wet well liquid level and are automatically alternated after each on-off cycle. Both pumps will automatically come on in the event of a high water alarm. Both pumps will shut-off automatically in the event of a low water alarm.

SCREENING

The raw waste is pumped directly to a static screen, located on the second floor of the IPS building, which screens out whole berries and other debris. Screenings drop directly onto a conveyor to a chute into a vibrating screen, which dewaters the screenings before going into a dumpster on the first floor. The static screen is capable of processing the maximum flow rate from both raw wastewater pumps. The screened effluent is then introduced into a 10” gravity line where nutrients and magnesium hydroxide are fed and ultimately discharges into the equalization basin.

EQUALIZATION

Screened effluent flows by gravity through a 10-inch PVC line to the two equalization basins. The basins normally run independently. However, in the event of high influent loading and flows, the equalization basins can be run in series. Mixing is provided in the equalization basin with coarse bubble air diffusers supplied by one of the two 100 horsepower positive displacement blowers located in the auxiliary building. The second blower serves as a standby. The blowers are equipped with two speed motors and are normally run on the low speed (67hp), unless both equalization basins are full or if batch treatment is the mode of operation in equalization basin “A”. In the event that two aeration basins and two secondary centrifugal blowers are on-line, the primary blower may be shutdown and the gate valve in the airline should be opened. In this mode the entire plant can be supplied air from the secondary blowers.

TRANSFER PUMPING

Wastewater is pumped out of the equalization basin the two self-priming centrifugal transfer pumps located in the auxiliary building. One transfer pump is capable of handling the maximum equalized wastewater flow rate with the other serving as a standby. The pumps are manually activated. Their discharge line is equipped with a modulating flow control valve with the necessary instrumentation and controls to deliver a constant output flow rate as selected by operating personnel. Since the outflow from the equalization basins is held constant by this system, the water level in the basins will rise and fall to accommodate variations in the raw wastewater flow rate. Operators will adjust the output flow rate based on the level in the equalization basins and expected production schedules over a seven day per week operating period. Other process parameters that would effect the operator's decision to adjust the transfer rate would be: influent loading, biological process health, and effluent characteristics.

RAPID MIX TANK

The transfer pumps deliver the wastewater, via a 6-inch PVC line, to the rapid mix tank. This tank is primarily used as a pass through to the aeration basins via a 6-inch telvalve. However, when necessary, nutrients, magnesium hydroxide and sodium hypochlorite can all be injected into this basin as needed.

ACTIVATED SLUDGE PROCESS

Secondary biological treatment is accomplished with the activated sludge process. The aeration basins; air supply blowers, piping, valves and diffusers; secondary clarifiers; and return activated sludge (RAS) and waste activated sludge (WAS) pumps, piping, and valves collectively form the activated sludge process. In this process microorganisms are grown in the form of suspended flocculent biosolids in the aeration basins. In order to grow and maintain their cell metabolism, the microorganisms consume the organic matter in the waste as food. Oxygen is supplied to the microorganisms using a coarse-bubble diffused aeration system. The liquid, or mixed liquid, in the aeration basins flows into the secondary clarifiers where the flocculent biosolids settle by gravity. The treated wastewater is discharged over V-notch weirs at the top of the clarifiers and the biological sludge is drawn off of the bottom. Most of the biosolids are pumped back to the aeration basin as the RAS in order to maintain a sufficient concentration of biosolids in the aeration basins for proper organic waste removal. The excess growth of microorganisms is removed from the system as the WAS for further processing and disposal.

Activated sludge process influent is received from the rapid mix tank. Neutralized wastewater exits the rapid mix tank through a telescopic valve and then flows through an 8-inch ductile iron line to the two aeration basins. The two 8-inch airlift pumps are used to lift the wastewater into the aeration basins. At design loading, the aeration basins are operated in series in either a plug flow

mode or step feed mode. They can also be operated in parallel in a complete mix mode. The waste is introduced into aeration basin #2 and then flows into basin #1. Coarse bubble air diffusers supplied by two of the three 250-hp centrifugal blowers located in the auxiliary building provide aeration. When organic loadings drop below design parameters, the aeration basins can be operated independently. With only one aeration basin on-line, only one of the 250-hp centrifugal blowers is needed to provide adequate aeration. Also, when running a single aeration basin, it is necessary to run a modified plug flow mode, with the primary effluent entering from the valve furthest from the discharge side of the tank. Operating in the modified plug flow mode will minimize short-circuiting.

When aeration basin #1 is operating independently or in conjunction with aeration basin #2, the mixed liquor exits aeration #1 through a 36-inch slide gate Into a rectangular channel which feeds two flow splitter boxes, each equipped with a 36-inch inlet slide gate. The gates in the splitter box divide the flow as desired between the two secondary clarifiers. The clarifiers normally operate in series, but they can be operated in parallel if desired. The mixed liquor flows by gravity from the splitter box through a separate 10-inch ductile iron influent line into the center feed well of clarifier #2. From clarifier #2 the effluent is then pumped into clarifier #1 with an 8-inch airlift pump. When operated in parallel the mixed liquor flows by gravity from the splitter box through two separate 10-inch ductile iron influent lines into the center feed wells of both clarifiers.

The clarifiers provide the quiescent conditions necessary to promote gravity settling and thickening of the mixed liquor suspended solids (MLSS) and proper clarification of the secondary effluent. Each clarifier is equipped with a circular, center feed type sludge collector mechanism with hydraulic differential sludge draw off for rapid sludge removal and recycle. The collected sludge is discharged through a separate 6-inch ductile iron RAS line from each clarifier. The RAS is lifted into the aeration basins using a separate 6-inch airlift pump for each RAS line. WAS can be removed from either of the RAS lines using separate timer actuated 6-inch airlift pumps, which discharge to the pre-mix basin of the sludge thickener. A hopper collection well and a 6-inch ductile iron sludge draw off line are also provided for each clarifier as a precaution for removal of excessively heavy sludge deposits. Each of these sludge lines is equipped with a timer actuated 6-inch airlift pump which discharges to the pre-mix basin.

Clarifier #2 may also be used as a primary clarifier. Primary effluent is pumped via the transfer pumps to the rapid mix tank, where piping has been installed along with 2 - 6” gate valves. In order to utilize clarifier #2 as a primary settling tank, the primary inlet gate valve (PR1) must be opened and the primary bypass (PR2) closed. In the primary mode, primary effluent is pumped via the transfer pumps through 6” PVC to the flow splitter box in aeration basin A. The primary effluent then flows through a 10” ductile iron influent line to the center well of clarifier #1. The primary effluent is then lifted via an 8-inch airlift pump to the front section of the rapid mix tank or clarifier #1 inlet portion. This clarifier inlet tank must be plugged with an 8-inch plug prior to use in the primary mode. When the clarifier inlet tank fills it will overflow the baffle between the two sections of the rapid mix tank. The flow will then spill into the rapid mix and down the telvalve to the aeration basin for secondary biological treatment.
Primary clarification may be used in the case of extreme organic influent loading.

EFFLUENT PUMPING

Secondary clarifier effluent flows by gravity, via an 8-inch PVC line to the effluent pump wet well. The effluent pumping system consists of a wet well, two self-priming centrifugal pumps, pump controls, and auxiliary piping and valves. The effluent pumps are located in the auxiliary building. These pumps deliver the wastewater, via a 6-inch ductile iron force main, to the POTW collection system. One pump is capable of handling the maximum equalized wastewater flow rate with the other serving as a standby. The pumps are activated by floats in the wet well and alternate on each on-off cycle. A pH probe is field mounted in the effluent well influent line, in conjunction with the PLC, provides monitoring of the effluent pH. If the pH is outside allowable range of 6.0 to 9.0, the PLC will reposition an automatic three-way control valve on the effluent pump discharge line to recycle the flow back to the equalization basins for re-neutralization. There is a 2-second delay, before the PLC will issue an alarm and go into recycle.

NUTRIENT ADDITION

An adequate supply of Urea (46%-Nitrogen) and Diammonium Phosphate are mixed in a 1000 gallon holding tank that is located on the first floor of the IPS. The Nutrients are added to the static screen effluent, with the dosage based on the nutrient requirements of an estimated influent COD loading. Two mechanical diaphragm pumps are provided to deliver a solution of urea and Diammonium phosphate to the static screen effluent line inside the IPS building. One of the two pumps is capable of delivering the maximum required nutrient feed with the other pump serving as a standby. The pumps are manually controlled by the operator to maintain the nutrient concentration proportional to the influent loadings.

SECONDARY SOLIDS HANDLING

WAS discharged to the pre-mix basin adjacent to the clarifier #2. Mixing and aeration of the pre-mix basin is provided by coarse-bubble air diffusers that are supplied with air from the activated sludge aeration system. The well blended WAS then flows by gravity to the adjacent sludge thickener. The sludge thickener provides the quiescent conditions that are necessary for efficient gravity thickening of the WAS within a range of 1.3-3.0 percent solids. The sludge thickener is equipped with circular, scraper-type sludge collector mechanism and a centrally located sludge collection hopper. Thickened sludge is drawn from the sludge hopper by a 6-inch, timer actuated airlift pump through a 6-inch ductile iron sludge draw off line. Thickened sludge is normally discharged through a 6”-inch PVC aerobic digester bypass line directly to one of the two manually operated positive displacement sludge pumps. When the aerobic digester is online, the 6”-inch ball valve (AD2) must be opened and the 6”-inch ball valve on the bypass line must be closed. The aerobic digester can then be filled with sludge from the gravity thickener utilizing the 6”-inch sludge

thickener airlift pump (ALP11). The thickener supernatant is discharged through a 6-inch ductile iron line and is recycled to the equalization basins or alternatively to the aeration basins utilizing a 6-inch airlift pump (ALP12). Air for mixing and auto-oxidation of the secondary biological solids in the aerobic digester is provided by coarse bubble air diffusers that are supplied with air from the activated sludge aeration system. A telescoping valve is provided to allow decanting of digester supernatant. Digester supernatant is recycled to the pre-mix basin using a manually operated 6-inch airlift pump. Digested sludge is pumped from the aerobic digester (or thickener) to the sludge holding basin adjacent to the equalization basins via 4-inch ductile iron line. Two manually operated positive displacement sludge pumps located next to the digester are used to transfer the sludge. One pump is designed to fill the sludge holding basin in 4 1/2 hours. The second pump serves as a standby.

Mixing and aeration is provided in the sludge holding basin with coarse bubble air diffusers supplied by one of the two 7.5 hp positive displacement blowers located in the IPS building. The second blower serves as a standby. The blowers are equipped with two-speed motors to regulate the airflow rate depending on the depth of sludge in the sludge holding basin. The blowers are normally run on low speed. Sludge quality increases if the blower is only run when sludge is being transferred or when mixing is needed due to long holding periods of sludge.

The sludge holding basin aeration system has also been equipped with the proper valve and piping in order to provide air to an equalization seed system. This system allows the operator to utilize seed sludge from clarifier #1 in equalization “A”. This is referred to as a modified contact stabilization, and provides the equalization with a seed so as to “jump start” a biological process prior to the aeration basin. In addition, a sump pump and 2” PVC line have been installed from the aeration basin drop box to either the EQ”A” or EQ”B” to add microorganisms to aid in the reduction of Volatile Organic Carbons (VOC). This line has been equipped with a timer and can be set at fifteen-minute intervals by the shift operator.

Supernatant can be decanted from the sludge holding basin by turning the blower off, allowing the sludge to settle and lowering the telescoping valve beneath the supernatant liquid surface. The rate of supernatant withdrawal can be controlled be throttling the plug valve in the filtrate sump located in the IPS building. The supernatant can either be diverted to the raw influent line or back into the sludge holding basin, utilizing 4-inch butterfly valves FS6 and FS7.

Sludge is transferred from the sludge holding basin to the belt filter press, via a 4-inch PVC line, using two variable speed progressive cavity pumps. One of the sludge pumps is capable of handling the maximum secondary sludge production with the other serving as a standby. The pumps are manually activated and the variable speed drives units are adjusted to deliver the desired sludge flow rate to the belt filter press. The pumps and the belt filter press are located on the first floor of the IPS building.

The belt filter press system includes two polymer-mixing tanks, two make-up water tanks a sludge flocculation tank, a gravity draining zone, and a pressure dewatering zone. Polymer is injected into the sludge feed line via a 1-hp variable

speed drive progressive cavity pump. The belt filter press will dewater the secondary sludge to approximately 16 percent solids. The sludge cake is transported via an incline screw conveyor to an overhead conveyor system that empties into a 20 yard dumpster.

The IPS is also equipped with an effluent reuse system that can be utilized to supply plant effluent to the belt filter press in place of city water. The plant water system pumps are located in a pump house adjacent to the rapid mix tank.